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硕　士　学　位　论　文

暴力犯罪的成因-运用实证方法分析

Determinants of Violent Crime
An Empirical Approach

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摘 要

是什么原因导致许多国家的暴力犯罪事件，尚无明确的解释。而其对社会的稳定，生活的质量和发展都产生重大影响。本文尝试从经济学角度分析和解释在发展中国家和发达国家产生暴力犯罪的原因。使用从 1995 年到 2012 年内 44 个国家的最新统计数据。

使用了基于系统 GMM 估计量的动态面板分析方法。结果表明：在控制解释变量的联合内生性后，人均收入和 GDP 增长率的提高有效的减少了暴力犯罪事件的发生。为解决内生性问题，我们使用自变量的滞后项作为工具变量。

关键词：犯罪; GMM; 动态面板数据; 横截面; 内生性

Abstract

There is no clear explanation for the causes of violent crime in some countries. However, crime extensively affects social stability, quality of life and development in those areas. In this paper, an economical approach is used to determine the causes of violent crime in both developed and developing economies by creating a dataset of 44 countries from 1995 to 2012. The results show that an increase in income per capita and GDP growth rate have negative and significant effects on violent crime when using dynamic panel data analysis based on GMM-System estimator and after controlling for the joint endogeneity of explanatory variables. In order to solve endogeneity problem, lagged values of independent variables are used as instruments.

Key Words: Crime; GMM; Dynamic panel data; Cross-sectional; Endogeneity

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Chapter 1 Introduction

1.1 Background

Crime is a problem affecting the general public. It threatens quality of life and the perceived security of societies. People may have different views on crime, seeing it as either a minor issue or a major crisis. When it rises dramatically, crime becomes a major concern in the political agenda. There have been times when crime has become the focus of the public's attention, like in the 1980s when drug-related crimes rose approximately 150% while violent crimes rose by 20% in the United States. In general, it is estimated that countries spend around 15% of GDP to fight crime.

Economic development is also affected by crime because it drives away foreign investments and human capital. Countries spend a high percentage of GDP to prevent crime instead of investing in education and infrastructure. According to the Colombian planning department, 19% of GDP was spent in the 1990s to reduce crime. Without this reduction in growth, Colombia would have reached an income per capita 32% higher than at present.

Western economies have seen a decrease in violent crimes in the last 10 years. In 2013, an estimated 1,163,146 violent crimes occurred in the United States, a decrease in 4.4 percent from the 2012 estimate[1]. In Latin American and Asian countries, crime has changed dramatically in the past 20 years. For example, in some countries, crime rates were high during the 1990s but decreased by more than 50% in early 2000s. This paper is an attempt to find what causes crime to change over time.

Governments do not have a clear strategy to reduce crime, though increasing the size of the police force or number of jails are some of the most popular choices. We hope to provide policy makers a better understanding of determinants of crime.

Crime has preoccupied economists for centuries. In 1776, Adam Smith wrote in the wealth of nations[2]:

[1] According to the FBI website: http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/violent-crime/violent-crime-topic-page/violentcrimemain_final

[2] Adam Smith. The wealth of nations, Book V, Chapter 1, Part II, Page 670. Orbis Editions, 1983

"The affluence of the rich excites the indignation of the poor, who are often both driven by want and prompted by envy, to invade his possessions"

Different datasets and econometric methodologies are implemented by the following literatures to determine the causes of crime. Andreoni (1995) performed a cross-sectional regression in a 1960 dataset with 40 countries. His results showed that the size of the penalties had a negative and significant effect on property crime. Cerro and Meloni (2000) used panel data from Argentina for the period 1990 to 1999. They included certain explanatory variables; such as the probability of arrest and conviction, unemployment rate, income per capita, inequality and education. Unemployment, inequality and GDP per capita were found to be positively correlated to crime rates when using a panel data regression with fixed effect and instrumental variable.

Choosing explanatories variables can be a challenging process. Previous research focused on different determinants to explain crime rates. Some studies investigated the relation between crime rates and variables such as immigration, urbanization, and education. Erdal Gumus (2004) applied OLS to a 1990 dataset of the United States. He created three sets of explanatory variables: economic variables (e.g. income per capita, unemployment rate, etc.), socioeconomic and demographic variables (land area, black population, etc.) and deterrent variables (size of the police force and judiciary system). He concluded that income, inequality, population and the presence of a large black population were all significant causes of crimes in urban areas.

Gaviria and Velez (2001) did not explain what caused crime. Rather, they tried to answer who is more affected by it. Using a dummy dependent variable and the probit model, they showed that the better-off bore most of crime violence while the worst-off bore most of domestic violence.

Instead of using OLS, 2SLS or fixed effects as our main technique, a different approach to most of mentioned literatures is implemented by using dynamic panel data. Fajnzylber, Lederman and Loayza (2000) conducted the most similar and famous research that estimated a dynamic panel data model by using a dataset from 1970 to 1995. Although a similar dynamic model is used, we choose a different

specification for the transformation part. In addition, we construct a more updated sample[3] and set independent variables into six categories: basic, deterrence, drugs, demographic, culture and other variables. Running a regression for each category allows us to estimate coefficients under different conditions to test robustness of our model.

1.2 Literature review

Becker (1968) was the first important research contribution to the economics of crime. Before his research, mental illness and poor values were considered the main determinants of crime. In his model, which was the base of this literature, he analyzed economic factors that could induce a person to commit crimes by using a cost and benefit model. In this model, people committed crimes as long as benefit was higher than cost. There were two main cost categories; deterrence cost (e.g. probability of arrest, severity of punishment, expected income from legal activities, etc.) and socio-economic cost (e.g. inequality, unemployment, immigration, urbanization, income per capita, education, etc.).

Some authors focused on studying just the deterrence part of crime, for example, Wong (1994), who included probability of arrest and severity of punishment as explanatory variables for an England and Wales sample. He concluded that criminals responded to incentives, such as changes in legal wage rate, for pursuing legal and illegal activities. Other papers concentrated just in the economic cost of crime, for example, Andreoni (1995), who used a data set of 40 countries and explanatory variables, such as average income, percentage of non-whites, unemployment rate and education, to conclude that punishment had a significant effect on crimes.

Studying the relation between crime and one specific variable is common. An example is a paper conducted by Bell, Machin, Francesco and Fasani (2010). They focused on immigration and its relation to crime in the UK. Many explanatory variables were used; asylum seekers, skilled migrants, percentage of population claiming welfare benefits and share of young adults in the population. Using panel data regression and controlling for endogeneity, the results showed that property

[3] We use a dataset from 1995 to 2012.

crimes were higher in areas where asylum seekers were located. However, this relation did not hold for educated migrants. Bianchi, Buonanno and Pinott (2008) also studied the relation between immigration and crime in Italy during 1990s. After controlling for endogeneity, they found no relation between immigration and any form of crime.

A second-order polynomial regression was implemented in Georgiou (2011) to study the relation between poverty and crime. Using a dataset of Europeans countries from 2000 to 2008, he concluded that there was a minimum level of crime at a critical level of poverty and crime rose beyond this level.

Studies on crime for the United States are widely available. Zhang (1994) relied on the OLS technique and a 1987 dataset of U.S. states to find the relationship between socioeconomic conditions and property crimes. Economic welfare programs such as giving cash were found to be significant and effective in decreasing crime. Levitt (1997) used a sample with 57 U.S. cities from 1970 to 1992, which included a set of socioeconomic and voting cycle variables. A negative relation between police personnel and crime was found.

Fajnzylber, Lederman, Loayza (2000) conducted the most relevant paper. They used a complete world sample with 45 countries. A set of socio-economic variables combined with deterrence variables were included. The sample period covered 1970 to 1995 and it was estimated using a generalized method of moments to control for endogeneity. As instruments, they used lagged values of explanatory and dependent variables. They concluded that inequality, economic growth rate and past crime rates explained criminal behavior.

1.3 Overview of the thesis

This paper is organized in the following way.

- Chapter 2 includes the definition and development of violent crime in the last 20 years. A model of criminal behavior is designed using cost-benefit analysis similar to Fajnzylber, Lederman, Loayza (2000) and Becker (1968).

- Chapter 3 presents the data description and analysis. This chapter explains dependent and explanatory variables included in the model. We also introduce the GMM-System estimator methodology and present regression coefficient estimations.
- Finally, chapter 4 shows the conclusions of this research.

Chapter 2 Crime around the world

2.1 Description of crime

2.1.1 Definition

A crime is an act that violates the law and it is usually punished by a court[4]. Crime is divided into two main categories; violent crimes (which includes homicides, rape and kidnapping) and property crimes (such as robbery, theft, burglary and motor vehicle theft). Crime data tends to be highly underreported, especially in developing economies. According to Soares (1999), underreported crime and the level of development were negative correlated.

When comparing the two types of crime, property-related crimes suffer more from underreporting as developing-country institutions, which are designed to fight crimes, are highly inefficient and corrupted. This causes people not to report if they have been victims of a crime. However, violent crime data such as homicides is more accurate since there is a body that cannot be ignored. To avoid any data collection bias, we focus on violent crimes, as measured by intentional homicides.

In order to validate the data underreporting issue, a small test is performed by taking a sample of two-country crime rates and comparing them. First, the theft crime rates between Australia and Colombia for 2010 are compared. The former country has a rate of 2,077 while the latter has only 198. Colombia, famous for having high criminal activities, is assumed to have higher theft rate than Australia. However, the data says the opposite. Second, the homicide data of same two countries is compared, Colombian's homicides rate is 32 while Australia's is 1. This information seems more accurate according to reality.

The following are additional definitions of violent crimes:

1. The oxford dictionary defines crime as "An action or omission which constitutes an offence and is punishable by law"[5].
2. According to the FBI, violent crimes are "those offenses which involve

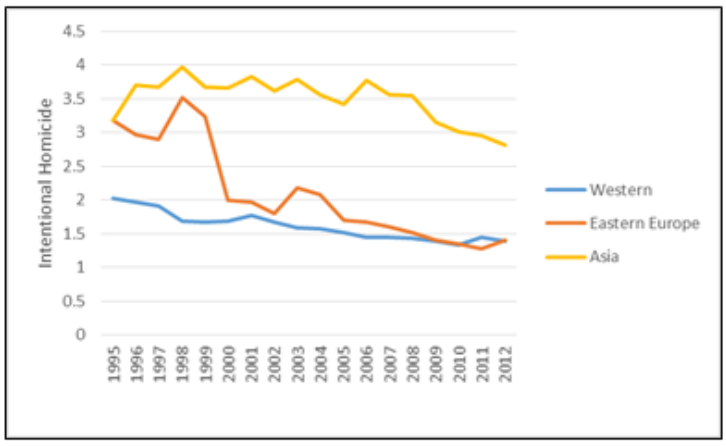
[4] According to the website: http://www.thefreedictionary.com/crime
[5] Oxford dictionary. http://www.oxforddictionaries.com/definition/english/crime

forces or threats of forces, violent crime is composed of: murder and no negligent manslaughter, forcible rape, and aggravated assault"[6].

2.1.2 Development

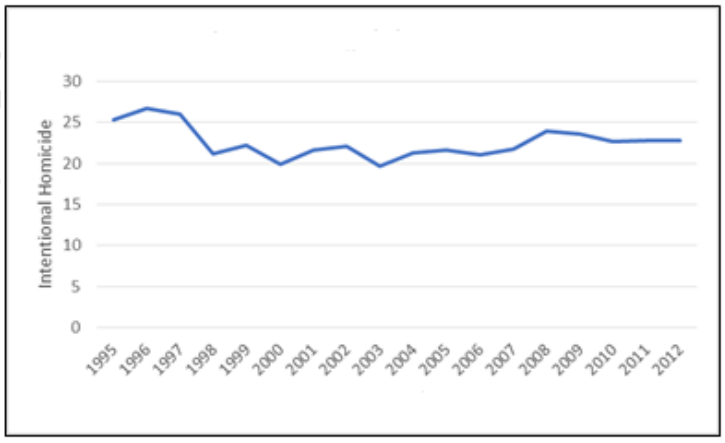
There is a downward tendency in violent crime rates during the last 20 years. In most regions, with Latin America as an exception, crime has decreased consistently. The following figure shows the development of crime, which is measured by intentional homicides, during the past two decades:

Figure 1: Crime development (1995 – 2012)[7]



Source of data: United Nations Office on Drugs and crime (UNODC)

Figure 2: Crime in Latin America (1995 - 2012)



Source of data: United Nations Office on Drugs and crime (UNODC)

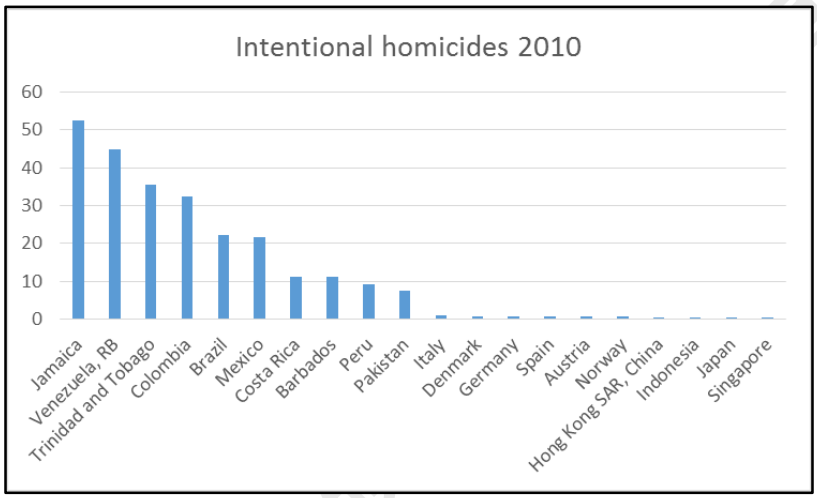
[6] FBI website : http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/violent-crime/violent-crime

[7] Western category includes all of Western Europe countries, Australia, Canada, New Zealand and the United States of America.

In certain Latin America countries such as Colombia, there was a decrease in crime rates in the past 10 years by more than 50%. The reasons for committing crimes have also changed over time. Political conflicts used to be the main motive of crime before the 1990s, instead of delinquency as it currently is.

The next graph represents the top and bottom 10 countries with the highest and the lowest levels of intentional homicides:

Figure 3: The most 10 safe and dangerous countries in 2010



Source of data: United Nations Office on Drugs and crime (UNODC)

To illustrate the relationship between different types of crimes, a correlation matrix is used. The correlation coefficients between homicide and each of the three crime types; robbery, burglary, and theft rates, are weak. The results lead us to conclude that crime types must be studied separately. This paper focuses on intentional homicide as a measure of crime. In future studies, research based on other types of crime may be extended.

Table 1: Correlation matrix between crime types

	homicide	robbery	burglary	theft
homicide	1.0000			
robbery	0.0930	1.0000		
burglary	-0.2651	0.1319	1.0000	
theft	-0.2743	0.0633	0.8250	1.0000

Source of data: United Nations Office on Drugs and crime (UNODC)

2.2 A model of criminal behavior

Based on previous literature, a model to choose explanatory variables in our research is developed by the following cost-benefit analysis theory, which is based on the Becker (1968) paradigm[8]. This theory states that people will commit crime as long as reward is higher than cost involved. The general equation of the model follows:

$$Net\ benefit = Expected\ income - Total\ cost \quad (1)$$

where *expected income* and *total cost* are expressed as:

$$Expected\ \mathrm{Income} = (1 - Prob.arrest) * Gain \quad (2)$$

$$Total\ cost = Cost\ of\ planning\ the\ crime + Forgone\ legal\ wage + (Prob.arrest * Punishment) + Moral\ cost \quad (3)$$

By replacing equation (3) and (2) into equation (1), the general form of the crime model is created. Based on this model, we select the explanatory variables that may affect the net benefit and economic incentives of crime. Table 2 represents a set of variables that may affect each section of equation (2) and (3) in different ways. The same table includes the expected effect of a variable on a particular section. In later chapters we explain potential causes of this relation.

The variables on the right side of Table 2 represent our main explanatory variables. Past participation in crime, which is simulated using the lagged values of the dependent variables, is expected to have a positive effect on the economic benefit of crime. If an individual has already committed a crime, he has also gained some related experience. This can reduce the probability of being arrested in future crimes and cost of planning a new one. Past involvement in crime can also decrease the probability of getting a legal job because of the stigma criminals have in society. In addition, it lowers the moral cost and facilitates, in a moral term, new commitment of crimes. In chapter 3, we show that the lagged values of the explanatory variables have a positive and significant effect on crime.

[8] We follow Fajnzylber, Lederman, Loayza (2000) cost-benefit model.